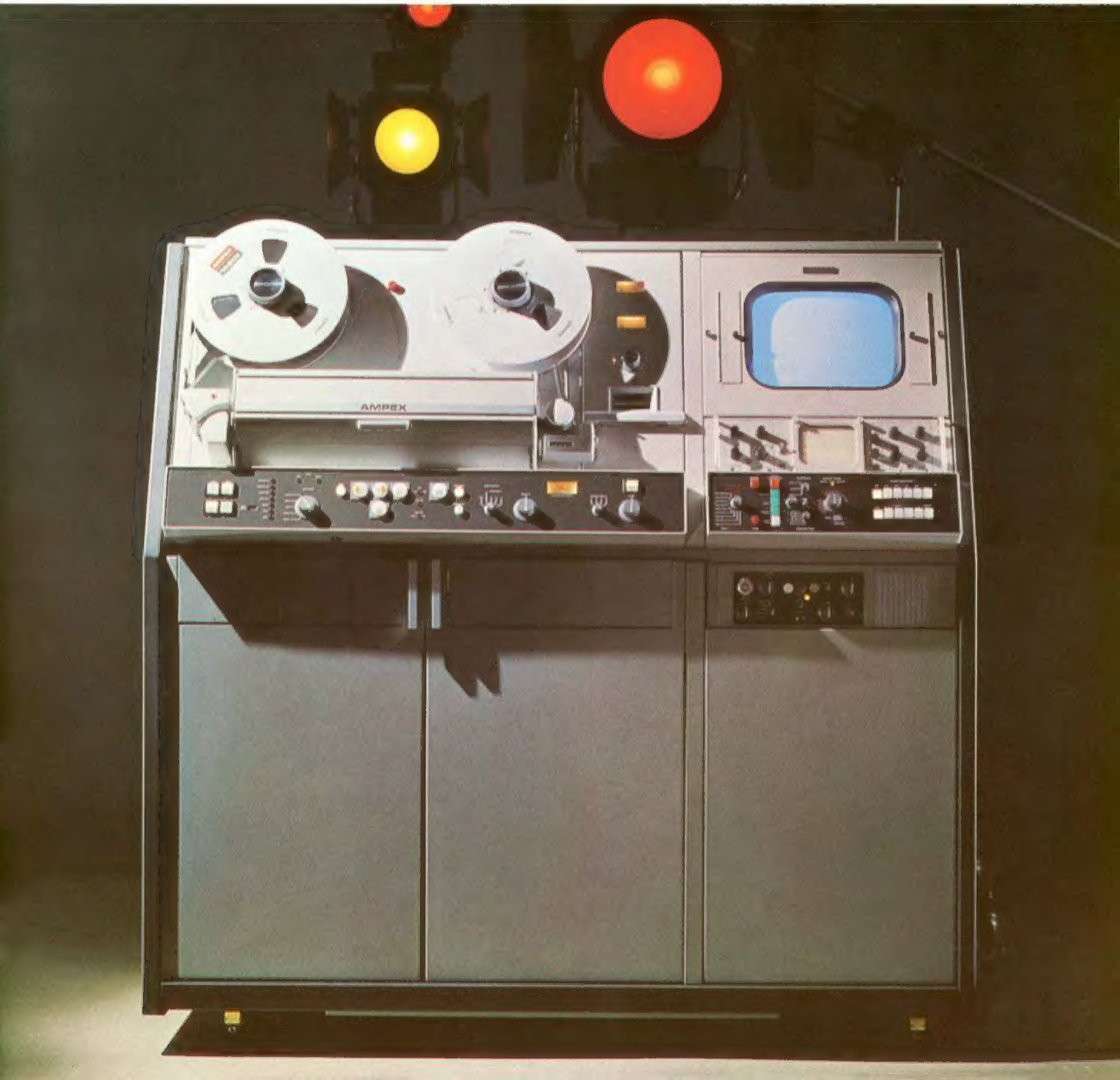
AMPEX

VR-2000B
color teleproduction videotape recorder



AMPEX

overwhelming choice of broadcasters, networks, teleproduction companies for over 11 years!

The reason is simple. The name "Ampex" has always been, and continues to be, synonymous with "excellence." No other company has been able to match Ampex's reputation for pioneering "the best" — then continuing to provide improvements and innovations to make "the best" even better!

In 1956, Ampex introduced videotape recording with the award-winning VR-1000. It revolutionized an infant television industry.

During the next two years, Ampex engineered the first practical color videotape system — introducing "burst-lock" color recording in 1958. A few years later, in 1961, Ampex revolutionized television a second time by introducing TWO innovations: a direct recovery color system that was immediately accepted as the INDUSTRY STANDARD, and, electronic editing that for the first time allowed standard production techniques to be applied to videotape recordings.

In 1963, Ampex revolutionized television a third time with HIGH-BAND COLOR. Introduction of our VR-2000 gave the industry a new standard — a standard that others are still trying to match.

And now, the ultimate refinement of the VR-2000 is available to the industry: the VR-2000B. It is THE color high-band videotape recorder of the future; nothing today is comparable. The VR-2000B offers: superb technical performance, incomparable ease of operation, a new level of system flexibility, and advanced teleproduction capability.

An "EMMY"† has been awarded to Ampex TWICE for outstanding technical achievement in the television arts. First, in 1956 for the VR-1000 — the world's FIRST videotape recorder. Again in 1967 for development of high-band color in the VR-2000.

VR-2000B

feature-for-feature... unmatched by any other VTR

(1) Proven video transport . . . ultimate refinement of a basic design in use in over 3000 Ampex videotape recorders throughout the world

(2) Mark Ten Video Head . . . with air bearings, nuvistor preamp and rotary transformer coupling for low noise . . . interchangeable with all other Ampex VTR's via plug-in preamp modules

(3) New non-scratch video erase head . . . does not contact tape oxide surface . . . eliminates possibility of tape-scratch

(4) New audio head . . . flip-down shield for easy cleaning

(5) New, removable video head cover . . . easy access to video head . . . held by only one captive thumbscrew (not shown)

(6) New reel hold-down knobs . . . precision-centering, positive-lock permits rapid tape loading/unloading . . . prevents distortion of plastic reels

(7) New plug-in head alignment sweep module . . . eliminates need for external sweep frequency generator (not shown)

(8) New audio-video monitor switch panel (optional version for Editec* system shown) offers complete picture and waveform monitoring capability . . . includes built-in video distribution amplifier to drive external picture monitors

(9) Full monitoring of all important VTR circuits with built-in, switchable A-Scope and metering

(10) Conrac professional-quality 14-inch picture monitor . . . with expanded pulse cross display . . . dual standard, 525/625

(11) Built-in Tektronix RM529 Waveform Monitor

(12) Functionally grouped operating controls and tally lights

(13) Signal system level adjustments . . . protected behind flip-down panel in cover door . . . easily reached when needed

(14) New audio/cue system: improved audio quality for multiple generation copies; built-in monitor speaker plus high-fidelity output for external speaker; audio spot erase for precise editing; built-in dynamic mike switchable to PROGRAM or CUE; 4 kHz cue tone oscillator switchable to either continuous tone or .5 second "beep"; built-in logic for optional Editor and Editec.

(15) Colortec* direct color recovery unit

(16) Amtec* time element compensator

(17) New system power supply . . . with circuit breakers and visual indicators on front panel

(18) Video signal system . . . with instant standards change for low/high band, monochrome/color

(19) Improved Intersync* servo . . . handles non-standard tapes

(20) Processing amplifier . . . new, convenient location

(21) Signal system and servo power supplies

OPTIONS:

(All optional equipment now "plugs-in" for easy field installation. See page 6 for descriptions of options.)

(22) Mark I Editec Program Unit

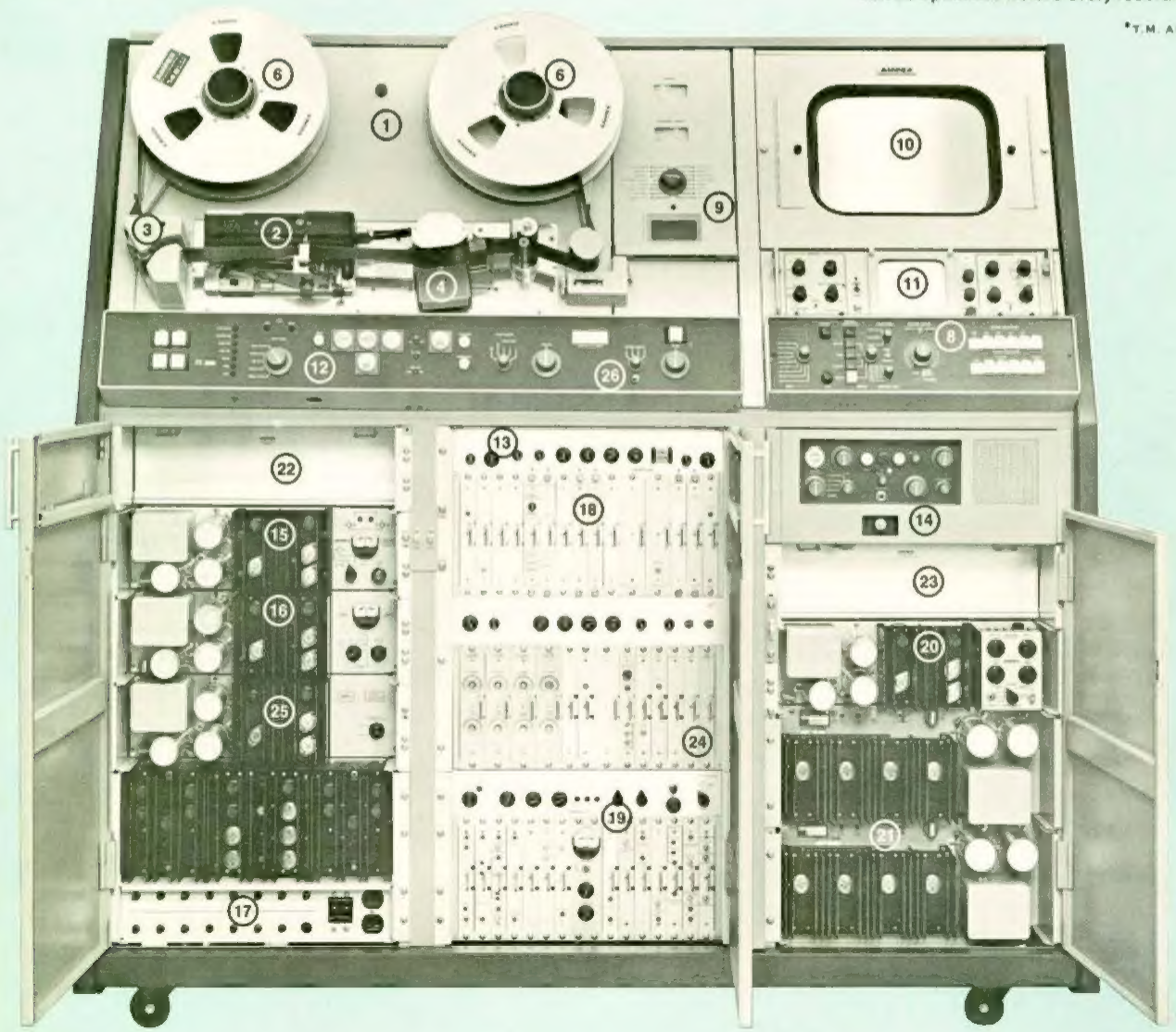
(23) Mark III Electronic Editor

(24) Auto-Chroma

(25) Velocity Compensator

(26) Video Head Optimizer . . . permits head optimization in 5 to 15 seconds. Heads can be optimized before every recording.

*T.M. AMPEX



VR-2000B

four zones for convenient, safe, error-free operation

VR-2000B is the ultimate answer for highly professional teleproduction. It is *designed* for smooth, convenient, safe, and error-free operation. There are NO controls in illogical sequence . . . or in awkward corners or recesses . . . above or near moving parts. All controls and adjustments are accessible in a logical order of priority.

1 set-up and test monitoring zone

The uppermost zone of the VR-2000B's front panel contains all transport and test monitoring functions — functions that are most often required before, after or between "live" operational periods with the VTR. Once a tape has been loaded on the transport, and key VTR signal functions checked, the operator is free to leave this zone and concentrate on primary and secondary controls.

2 primary control zone

All frequently used operating controls are clustered in the highly accessible primary zone of the VR-2000B. Unless there is a deficiency in the tape, the operator never has to leave this zone. Primary controls are arranged in a logical sequence so minimal operator training is required. They incorporate meaningful tally lights that indicate either CAUTION (yellow), OK (green) or WARNING (red). Transport control logic incorporates a unique "memory" feature to safeguard against possible tape damage, yet leaves the operator in full command of the equipment.

1 Set-up and Test Monitoring Zone

2 Primary Control Zon

3 Secondary Control Zone

4 Maintenance Zone

3 secondary control zone

Immediately below the zone of most frequently used controls, a secondary zone contains controls needed only when adjustment is required to play an improperly recorded tape — or for cueing and dubbing. Video signal system controls in this zone are located behind a flip-down panel to discourage inadvertent knob "twiddling." Audio adjustment and cue controls are accessible from the front panel.

4 maintenance zone

The bottom section of the VR-2000B, behind hinged doors, contains all adjustments needed for VTR alignment, periodic maintenance or emergencies. Normally, this zone is never entered by operating personnel. The only entry that might be needed would be to make corrections for non-standard tapes.

Easy-to-load tape path contains: (A) new non-scratch video erase head, (B) Mark Ten video head with rotary transformer coupling . . . interchangeable with other Ampex VTR's via plug-in modules, (C) new flip-down audio head shield for easy cleaning.

New reel hold-down knobs facilitate fast tape loading/unloading.

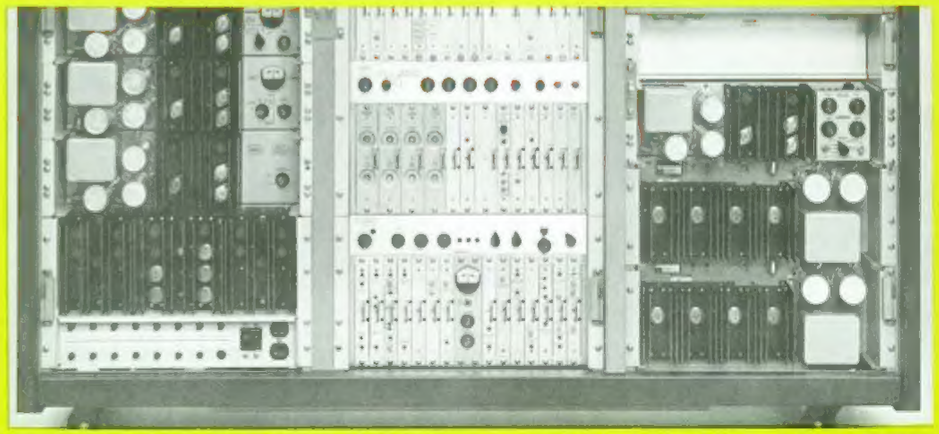
Important VTR circuits fully monitored with built-in A-Scope.

Logically arranged panel features: (A) full protection at-a-glance with meaningful CAUTION, OK and WARNING lights . . . plus other fail-safe features, (B) complete front panel servo mode control, (C) centralized, interlocked controls for convenient and error-free operation, (D) front panel control and meter indication of all four tracking modes.

New monitor Switch Panel provides maximum flexibility in handling audio/video signals at all key points within the system.

Video signal system controls behind protective flip-down panel . . . permit compensation for improperly recorded tapes.

New, audio/cue system has: (A) "spot erase" feature, (B) built-in dynamic mike, (C) switchable cue tone oscillator, (D) built-in speaker plus high-fidelity output for external speaker.



Test points and set-up adjustments are easily reached in this zone . . . allowing convenient maintenance on all system components. Unitized, printed circuit construction permits use of small extender boards during maintenance, saves floor space.

VR-2000B

technical excellence and capability-extending options

The standard VR-2000B is built and tested as a complete color/monochrome system. It incorporates a Colortec direct color recovery unit, Intersync servo and Amtec time element compensator. Due to its flexibility, it is available in a simplified monochrome configuration that operates on both domestic and international line standards. Or, it can be furnished as a complete international color system for PAL and SECAM standards. Field conversion of any VR-2000B to any line standard can be accomplished by simply changing plug-in modules. Contact Ampex, or your Ampex representative for details on non-standard configurations.

The standard VR-2000B will operate on either high-band or low-band, color or monochrome (instantly switchable). It is compatible with all previous 4-head recorders. On high-band, extended bandwidth provides more room for color and an adequate guard band. This dramatically increases signal-to-noise ratio and reduces moire.

multi-generation dubs

Because of its extremely low noise and distortion in high-band, the VR-2000B can be used to produce multi-generation copies that still look like the original color tape at the fourth generation! This ability to produce perfect copies has earned the VR-2000B's predecessor, the VR-2000, an unparalleled reputation as a true teleproduction recorder. It allows tremendous production flexibility via back-and-forth dubbing using electronic editing techniques.

mark ten video head

All VR-2000B's are equipped with the rotary transformer, nuvistor preamp Mark Ten Video Head. This outstanding video head is equipped with air bearings, and is interchangeable with all transverse head assemblies in other air-bearing Ampex VTR's (simply by changing plug-in preamp modules). Rotary transformers in the Mark Ten provide long-life, trouble-free and low-noise coupling to built-in transducers. Unitized transducers permit close matching of individual heads on any drum—for similarity of electrical and mechanical characteristics. Transducers utilize long-life AlFeSil pole tip material, plus special "high efficiency" construction, to provide the high output. This, coupled with the nuvistor preamp, results in extremely good signal-to-noise and low differential noise.

Mark Ten Video Head

non-scratch video erase head

An entirely new kind of video erase head has been designed for the VR-2000B to eliminate the problem of tape-scratch caused by head-to-oxide erase methods. This novel erase assembly eliminates all possibility of scratch lines because it contacts tape on the non-oxide (base film) side only. It erases **through** the base film with no loss of erase efficiency. This new head retains the selective erase capability required by the optional Editec system.

New Non-Scratch Video Erase Head

optional electronic editing

Any VR-2000B can be factory or field equipped with the optional Ampex Electronic Editor and Editec system. The Electronic Editor permits electronic splicing of program material, color or monochrome. Scenes can be assembled or substituted at will—without discontinuity of video, audio or sync. Editing is accomplished with push-button ease at either 7½ or 15 ips.

Editec Control Panel

Addition of an Editec system to the VR-2000B allows assembly or substitution of material frame-by-frame. It offers the most precise editing control—and even allows animation directly on tape; simultaneously, it can activate other equipment or cue performers "on camera."

optional auto-chroma

Color videotape operation presents a greater tape interchangeability problem than monochrome. Addition of the optional Ampex Auto-Chroma to the VR-2000B greatly minimizes these problems. It provides fast, continuous and automatic control of color saturation from each of the four video heads—without the need for head readjustment. For playback of tapes made on other machines, Auto-Chroma assures tighter, faster control of chroma, reduced head bandi and minimal need for operator attention. See back page for dramatic comparison.

Auto-Chroma Modules

One-Line Delay Module

optional electronic timer

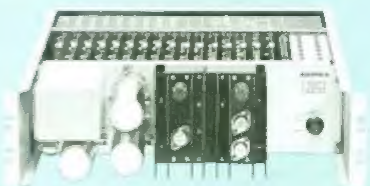
The new timer is available as an option on the VR-2000B. It not only provides accurate, easily read ELAPSED TIME or TIME REMAINING on its illuminated readout—but also allows VTR control of other station/studio equipment. The Electronic Timer displays accurate time at 15 ips and 7½ ips tape speeds and at both 50 Hz and 60 Hz line frequencies.

optional one-line delay

The optional One-Line Delay can be used with the VR-2000B to compensate for video tape dropouts. When a dropout is sensed by the unit, material from the previous good line (stored in the One-Line Delay) is substituted for the missing material in the bad line.

optional automatic velocity compensator

VTR velocity errors may result from differences in head tip velocities that are caused by variances in female guide height and recording radius. Velocity errors appear as color hue banding in pictures. This banding is effectively nullified by adding the optional Ampex Velocity Compensator to the VR-2000B. Operating in conjunction with the Amtec compensator and Colortec unit, the Velocity Compensator is designed for fully automatic, unattended operation. It is a particularly vital option for color teleproduction and duplication. See back page for dramatic comparison.



Automatic Velocity Compensator

VR-2000B

specifications

Dimensions
Height, 63" (160 cm); width, 65" (165 cm); depth, 31" (78.7 cm).
Weight, 1300 lbs. maximum.

Temperature and Humidity
Temperature: 0°C to 45°C.
Relative Humidity: 10% to 90%.

Power Requirements
Input Power: 117 V ±10%, tapped for 105-115-125 V, 60 Hz 30 A. (Will regulate and operate without changing taps from 105-125 V.)
OR —
230 V ±5%, tapped for 210-220-230-240-250 V, 50 Hz, 15 A.
Convenience Outlet: 4 115 VAC outlets fused for 16 A total.

Signal Requirements
Video Composite Signal: 0.5 to 1.5 V peak-to-peak composite, sync negative, EIA-FCC standard or 405, 625 line standards (819 on custom order), 75 ohm unbalanced.
Sync Input: 75 ohms, 2 to 8 V, peak-to-peak.

Audio Input
Program and Cue Lines: 15 K Ω input impedance, balanced or unbalanced, bridging a 600 Ω line factory set for +8 dBm level. With minor board modifications, minimum levels of −12 dBm at 600 Ω or −24 dBm at 150 Ω can be accepted.
Microphone: Built-in dynamic microphone, switchable to cue or program channel.

Audio Output
Audio and Cue Lines: 600 Ω balanced or unbalanced, factory set for ±8 dBm. With minor board modifications, maximum outputs of +16 dBm at 600 or +16 dBm at 150 Ω may be obtained.

OPERATING CHARACTERISTICS

Tape Speed
7½ or 15 ips as selected by front panel switch (19.85 cm/sec or 39.7 cm/sec on 50 field/sec systems).

Recording Time
96 minutes on 14" (35.6 cm) 7200' reel of tape at 15 ips (38 cm/sec).
192 minutes on 14" (35.6 cm) 7200' reel of tape at 7½ ips (19 cm/sec).
Normally supplied for operation with 12.5" (30.5 cm) reels

Picture and Sound Separation
18½ frame, sound leads, at 15 ips.
37 frame, sound leads, at 7½ ips.

Stability
Jitter (i.e., disturbance rates greater than 1 Hz): ±0.075 μsec.
Drift (i.e., disturbance rates less than 1 Hz): ±0.1 μsec.
Geometric: Less than ±0.15 μsec during replay of a recording on the tracks selected to produce maximum error.

Video Standards
Standards available: 4.28 MHz—5.0 MHz—6.8 MHz Dev., Monochrome Pre-emphasis, 525 line, Low Band (per SMPTE RP-6).
5.5 MHz—5.79 MHz—6.5 MHz Dev., Color Pre-emphasis, 525 line, Color (per SMPTE RP-6).
4.95 MHz—5.54 MHz—6.8 MHz Dev., Monochrome Pre-emphasis, 625 line, Low Band.
7.16 MHz—7.8 MHz—9.3 MHz Dev., E.B.U., Mono/Color Pre-emphasis, 625 line, High Band.
4.28 MHz—5.0 MHz—6.8 MHz Dev., Monochrome Pre-emphasis, 405/525 line, Low Band.
7.06 MHz—7.9 MHz—10.0 MHz Dev., Mono/Color Pre-emphasis, 525 line, High Band (per SMPTE RP-6).

Monitoring Facilities
Video: A Conrac CZB14/R (35.6 cm) video monitor and a Tektronix RM529 waveform monitor are provided.
Audio and Cue: 10 watt audio amplifier has frequency response, 40 Hz to 20 kHz. Six-position switch monitors Line In, Line Out, Cue In, Cue Out, Monitor Head and Spare.
System: A built-in "A" Scope provides monitoring of the following:
Control Track Playback (Normal Head), Control Track Playback (Simultaneous Monitor Head), Expanded Control Track Playback (Simultaneous Monitor Head), Switcher R-F Output, Drum Tachometer Signal Input to Servo, Drum Error, Capstan Error, Amtec Error, Colortec Error, Drum Oscillator for Setting Frequency, Capstan Oscillator for Setting Frequency, Record Control Track Current, Chroma Level, Velocity Compensator Error.

AUDIO CHARACTERISTICS

Bandwidth
±2 dB, 50 Hz to 15 kHz at 15 ips
±2 dB, 50 Hz to 10 kHz at 7½ ips

— 55 dB below 3% distortion at 1000 Hz

Flutter and Wow
0.15% rms at 7½ ips, 0.10% rms at 15 ips measuring components from 0.6 to 250 Hz
NOTE: Meets USA Standard C98-3-1963 response characteristics switchable to Ampex standard specifications and CCIR (for playback and recording of older tapes).

CUE TRACK CHARACTERISTICS

Bandwidth
±3 dB, 60 Hz to 8 kHz at 15 ips
±3 dB, 60 Hz to 6 kHz at 7½ ips
NOTE: Response has a 16 dB notch at 240 Hz on 60 Hz systems; 16 dB notch at 250 Hz on 50 Hz systems.

Flutter and Wow
Same as audio channel

Signal-to-Noise Ratio
45 dB below 5% distortion at 1000 Hz

VIDEO RESPONSE CHARACTERISTICS

	Domestic		International	
Monochrome	**525/60 Low Band**	**525/60 High Band**	**625/50 Low Band**	**625/50 High Band**
Bandwidth:	Flat to 3.8 MHz; —3 dB at 4.2 MHz; Tolerance ±1 dB	Flat to 4.1 MHz; —3 dB at 4.5 MHz; Tolerance ±0.5 dB	Flat to 4.5 MHz; —3 dB at 5.0 MHz; Tolerance ±1 dB	Flat to 5.5 MHz; —3 dB at 6.0 MHz; Tolerance ±0.5 dB
Signal-to-Noise Ratio:	45 dB peak-to-peak video to rms noise on interchange basis (Monochrome)	46 dB peak-to-peak video to rms noise on interchange basis (Monochrome and Color)	42 dB peak-to-peak video to rms noise on interchange basis (Monochrome)	43 dB peak-to-peak video to rms noise on interchange basis (Monochrome and Color)
Transient Response:	Maximum K-Factor 2% (Utilizing 2T sine² pulse)	Maximum K-Factor 1% (Utilizing 2T sine² pulse)	Maximum K-Factor 2% (Utilizing 2T sine² pulse)	Maximum K-Factor 1% (Utilizing 2T sine² pulse)
Low Frequency Linearity:	2% Blanking to White (max.)	2% Blanking to White (max.)	2% Blanking to White (max.)	2% Blanking to White (max.)
Rise Time:	0.12 μsec maximum (.02 μsec or less rise time on input pulse)	0.11 μsec maximum (.02 μsec or less rise time on input pulse)	0.10 μsec maximum (.02 μsec or less rise time on input pulse)	0.08 μsec maximum (.02 μsec or less rise time on input pulse)

Color	**525/60 Low Band**	**525/60 High Band**	**625/50 Low Band**	**625/50 High Band**
Signal-to-Noise Ratio:	40 dB peak-to-peak video to rms noise on interchange basis	46 dB peak-to-peak video to rms noise on interchange basis	—	43 dB peak-to-peak video to rms noise on interchange basis
Differential Gain:	Less than 4% Blanking to White	Less than 4% Blanking to White	—	Less than 4% Blanking to White
Differential Phase:	Less than 4° at 3.58 MHz off tape	Less than 4° at 3.58 MHz off tape	—	Less than 4° at 4.43 MHz off tape
Maximum Color Phase Error (due to Differential Phase):	2° maximum (75% Color Bars, 3.58 MHz Subcarrier)	2° maximum (75% Color Bars, 3.58 MHz Subcarrier)	— (75% Color Bars, 4.43 MHz Subcarrier)	2° maximum (75% Color Bars, 4.43 MHz Subcarrier)
Moire:	—24 dB minimum (Color Bars 75% amplitude, 3.58 MHz)	—40 dB minimum (Color Bars 75% amplitude, 3.58 MHz)	— (Color Bars 75% amplitude, 4.43 MHz Subcarrier)	—30 dB maximum (Color Bars 75% amplitude, 4.43 MHz Subcarrier)

These specifications supersede all previous specifications, stated or implied.
Term financing and leasing available on all equipment and systems.

VR-2000B...

perfect color from original tape to fourth generation dub

multi-generation dubbing . . .

The high-band color signal system used in the VR-2000B allows dubbing of original color tapes to four generations or more! At the fourth generation, color and resolution are only slightly degraded. In the actual, unretouched color monitor photos at the right, the dramatic similarity of an original color picture and its fourth generation dub are compared.

Color monitor picture from original tape.

Color monitor picture from fourth generation dub.

Above photos of the Lennon Sisters are reproduced courtesy of the Lawrence Welk Show and its producers.

auto-chroma

Since color presents a greater tape interchangeability problem than monochrome, Ampex has engineered an Auto-Chroma to provide fast, automatic control of color saturation from each of the four video heads on the VR-2000B. The optional Auto-Chroma is also useful for playing tapes made on other machines—providing tighter, faster control of chroma, reduced head banding and less operator attention.

Auto-Chroma "out-of-circuit" during replay of tape; case of chroma banding.

Auto-Chroma "in-circuit" during replay of tape.

automatic velocity compensator

Different recorders may have different video head mechanical tolerances—and thus produce errors resulting from differing head tip velocities. These picture errors, particularly color hue banding, are effectively nullified by the optional Ampex Automatic Velocity Compensator. Actual color monitor pictures at the right demonstrate the effective correction made by the Velocity Compensator.

Velocity Compensator "out-of-circuit" during replay of tape; velocity error.

Velocity Compensator "in-circuit"; removes color hue banding.

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